BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

What is claimed is:

1. A flat wiper blade assembly, comprising:

a resilient wiper element extending longitudinally and having a crown, a neck and a body; and

an extruded rigid metallic frame extending longitudinally between opposite ends, said frame including an open bottom channel having a pair of laterally spaced side walls and a bottom wall, said bottom wall formed with a longitudinally extending slot, said crown of said wiper element being disposed in said bottom channel, said neck extending through said slot and said body extending below said frame; said frame including an upper channel having a partition wall separating said upper chamber from said lower chamber, a pair of laterally spaced side walls of said upper chamber extending upwardly from said partition wall, and a top wall extending between said side walls and spaced from said partition wall to enclose said upper channel.

2. The flat wiper blade assembly of claim 1 wherein a side wall of said bottom channel has a locally mechanically deformed protuberance laterally inwardly into gripping engagement with said wiper element to secure said wiper element against longitudinal movement relative to said bottom channel.

3. The flat wiper blade assembly of claim 2 wherein said protuberance extends into said crown portion to maintain said wiper element in said bottom channel.

4. The flat wiper blade assembly of claim 1 wherein said upper channel has opposite open ends.

5. The flat wiper blade assembly of claim 4 further comprising at least one plug disposed in at least one of said open ends.

6. The flat wiper blade assembly of claim 5 wherein said at least one plug has a face portion covering at least a portion of said bottom channel.

7. The flat wiper blade assembly of claim 4 wherein said upper channel has a fluid inlet for receiving wiper fluid into said upper channel and a fluid outlet for discharging wiper fluid from said upper channel.

8. The flat wiper blade assembly of claim 7 further comprising a fluid nozzle communicating with said fluid outlet.

9. The flat wiper blade assembly of claim 7 wherein said fluid inlet is provided in said at least one plug.

10. The flat wiper blade assembly of claim 1 wherein said wiper element is releasably supported with said bottom channel.

11. The flat wiper blade assembly of claim 1 wherein said upper channel has a fluid inlet opening for receiving wiper fluid within said upper channel and a fluid outlet opening for discharging wiper fluid from said upper channel.

12. The flat wiper blade assembly of claim 11 wherein said an opening for receiving wiper fluid is in one of said ends.

13. The flat wiper blade assembly of claim 11 including a fluid nozzle communicating with said fluid outlet opening.

14. The flat wiper blade assembly of claim 1 further comprising a mounting aperture formed in said side walls of said upper channel for receiving a mounting pin.

15. The flat wiper blade assembly of claim 14 further comprising a grommet disposed in said aperture and sealing said aperture against fluid leakage from said upper channel.

16. The flat wiper blade assembly of claim 1 wherein said frame is fabricated of extruded aluminum.

17. A flat wiper blade assembly, comprising:

a wiper element; and

an extruded metallic frame having a bottom channel in which said wiper element is disposed, said frame having a closed upper channel provided with a fluid inlet for receiving wiper fluid into said upper channel and a fluid outlet for discharging wiper fluid from said upper channel.

18. The flat wiper blade assembly of claim ~~15~~ wherein said extruded frame is aluminum.

19. The flat wiper blade assembly of claim 15 wherein said lower channel has a slot and said wiper element has a crown disposed in said lower channel and a neck extending through said slot..

20. The flat wiper blade assembly of claim 17 wherein said bottom channel is staked in at least one location to grip and retain said wiper element against longitudinal sliding movement within said lower channel.

21. A method of manufacturing a flat wiper blade assembly, comprising:

providing a wiper element;

extruding a metallic frame having a generally closed upper channel and a bottom channel with a slot traversing through a wall spanning the length of the bottom channel to receive the wiper element;

slidably inserting the wiper element into the bottom channel of the frame so that the wiper element depends from the bottom channel and through the slot to make wiping contact with a surface to be wiped; and

staking a wall of the bottom channel to fix the wiper element within the bottom channel of the frame.

22. The method of manufacturing a flat wiper blade assembly of claim 21 wherein the wiper element is provided with a crown portion and a neck portion depending from the crown portion wherein the crown portion is received within the bottom channel and the neck portion depends through the slot so that the wiper element can make wiping contact with a surface to be wiped.

23. The method of manufacturing a flat wiper blade assembly of claim 21 wherein the bottom channel is formed having a pair of lips extending generally toward one another adjacent the neck portion of the wiper element in underlying relation to the crown portion.

24. A method of manufacturing a flat wiper blade assembly, comprising:

forming a wiper element;

extruding a metallic frame having a generally closed upper channel and an open bottom channel with a slot traversing through a wall spanning the length of the bottom channel to receive the wiper element;

slidably inserting the wiper element into the bottom channel of the frame so that the wiper element depends from the bottom channel and through the slot to make wiping contact with a surface to be wiped; and

installing a pair of end plugs into an opening at each end of the upper channel and across least a portion of the bottom channel to releasably maintain the wiper element within the bottom channel.

25. The method of manufacturing a flat wiper blade assembly of claim 24, further comprising:

providing for a grommet having a through hole;

forming an aperture in at least one sidewall of the upper channel;

inserting the grommet into the aperture so that the grommet is maintained with the aperture and provides for a fluid tight seal between a mounting pin passing through the hole in the grommet and the aperture.

26. The method of manufacturing a flat wiper blade assembly of claim 24, further comprising:

providing for a hose and a nozzle;

forming an opening in a sidewall of the upper channel;

connecting the hose to an opening in an end plug to provide for communication between the upper channel and a source of wiper fluid under pressure; and

inserting the nozzle into the opening in the sidewall of the upper channel so that wiper fluid can be dispensed through the nozzle and onto a surface to be wiped.